

IN THE SPECIFICATION:

Please replace the following paragraphs and tables of the instant specification as shown below:

Page 1, lines 22-27, replace the paragraph with the following amended paragraph:

B1
Recently, since the semiconductor devices are getting smaller and lighter, the reliability of EMC is more important than ever before. Moreover, the semiconductor devices are heated to above 200°C when they are being mounted, resulting in cracking and thus delamination of EMC due to the CTE mismatch. This phenomenon is even worse if moisture is present, which is usually absorbed into EMC.

Page 3, lines 26 - page 4, line 3 (i.e., the paragraph bridging pages 3-4), replace the paragraph with the following amended paragraph:

B2
To be free from the aforementioned shortcomings, an object of this invention is to provide surface modification method for silica in order to enhance the adhesion to epoxy resin. Silica is coated by plasma polymerization coating with one monomer selected from 1,3-diaminopropane, allylamine, pyrrole, 1,2-epoxy-5-hexene, allylmercaptan and allylalcohol, and subjected to preparation of EMC in order to provide good properties of EMC compare with conventional method. The monomers containing amine functional groups may generate chemical bonds with epoxy resin

Page 4, line 23 - page 5, line 5 (i.e., the paragraph bridging pages 4-5), replace the paragraph with the following amended paragraph:

B3
This invention is also characterized by a surface modification method of silica for EMC, wherein plasma polymerization coating of silica comprises the steps of:

- 1) charging of silica with average diameter of 25-35°C into a plasma polymerization reactor 1, followed by vacuuming to 1×10^{-3} torr;
- 2) introducing monomer (1,3-diaminopropane, allylamine, pyrrole, 1,2-epoxy-5-hexene, allylmercaptan or allylalcohol) into the reactor via steel pipe; and,

B30
conc

3) rotating the reactor at 1-50 rpm at plasma polymerization conditions: plasma powder (10-40 W), gas pressure (40-50 mtorr) and treatment time (20-40 seconds).

B30

Page 5, lines 6-7, replace the paragraph with the following amended paragraph:

B4

Since the chemical structures of the monomers are different, the plasma polymerization conditions have to be optimized for each monomer.

B4

Page 6, lines 1-6, replace the paragraph with the following amended paragraph:

B5

The EMC for semiconductor package is prepared as follows:
Epoxy resin, hardener and promoter are mixed at 150°C for 3 minutes. Then, plasma polymer coated silica was charged into the resin mixture and stirred for 5 minutes, followed by pouring into silicon rubber mold. The resin mixture was placed in a vacuum oven of 130°C and degassed for 3 minutes, followed by curing in an air-convection oven of 175°C for 4 hours.

B5

Page 7, line 26 - page 8, line 5 (i.e., the paragraph bridging pages 7-8), replace the paragraph with the following amended paragraph:

B6

Examples 9-16 and comparative example 1: Preparation of EMC

As shown in Table 2, epoxy resin, hardener and promoter were mixed at 150°C for 3 minutes. Then, surface modified silica (Examples 1-8) or unmodified silica were charged into the resin mixture and then pouring into silicon rubber mold. In order to remove any volatiles which may form bubbles and thus lowering flexural strength, the resin mixture was degassed in a vacuum oven of 130°C for 3 minutes and then, cured in an air-convention oven of 175°C for 4 hours.

FINNEGAN
HENDERSON
FARABOW
GARRETT &
DUNNER LLP

1300 I Street, NW
Washington, DC 20005
202.408.4000
Fax 202.408.4400
www.finnegan.com

Page 8, beginning at line 6, replace Table 2 with the following amended

Table 2:

Table 2

B7

Category		Example								Com. Exp.
		9	10	11	12	13	14	15	16	1
Composition (g)	Silica	Exp. 1	24							<i>RECEIVED APR 16 2003</i>
		Exp. 2		24						<i>TG 1700</i>
		Exp. 3			24					
		Exp. 4				24				
		Exp. 5					24			
		Exp. 6						24		
		Exp. 7							24	
		Exp. 8								24
	Silica									24
Epoxy resin ¹⁾		10.19	10.19	10.19	10.19	10.19	10.19	10.19	10.19	10.19
Hardener ²⁾		5.78	5.78	5.78	5.78	5.78	5.78	5.78	5.78	5.78
Promoter ³⁾		0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03

B7

1) Biphenyl type epoxy
2) Phenol novolac
3) Triphenylphosphine

B8

Page 9, lines 1-10, replace the paragraph with the following amended paragraph:

Experimental examples 1-7

The properties of EMC, prepared from Examples (9-14) and Comparative example 1 were evaluated by the test method as follow;

1. The flexural strength of EMC was measured with a sample of 3x10x60 mm by 3-point banding according to ASTM D 790.
2. The CTE of EMC was measured by TMA in a glassy state (lower than Tg) and in a rubbery state (higher than Tg).

B8
filed
1/16/03

3. The water absorption of EMC was evaluated by exposing in a pressure cooker of 121°C, 2 atm and 100% RH for 8, 16, 24 and 32 hours. Three specimens (3x10x60 mm) were evaluated.

Page 9, beginning at line 12, replace Table 3 with the following amendment d

Table 3:

B9
Table 3

Category	Sample	Flexural strength at room temp (MPa)	Flexural strength at 250 °C (MPa)	CTE (µm/m°C)		Water absorption (wt%)			
				Glassy region	Rubber region	8 hr	16 hr	24 hr	32 hr
Test 1	Exp. 9	167±3	7.5±0.5	42	128	0.50	0.66	0.70	0.70
Test 2	Exp. 10	165±4	7.2±0.8	39	128	0.49	0.64	0.71	0.71
Test 3	Exp. 11	157±3	5.6±0.7	33	133	0.55	0.72	0.78	0.75
Test 4	Exp. 12	154±3	5.7±0.9	37	135	0.49	0.69	0.77	0.76
Test 5	Exp. 13	152±5	6.0±0.3	38	143	0.58	0.75	0.74	0.76
Test 6	Exp. 14	148±5	5.5±0.4	33	140	0.56	0.68	0.76	0.76
Test 7	Comp.	140±5	5.6±0.7	35	145	0.54	0.70	0.81	0.81
	Exp. 1								

B10
IN THE CLAIMS:

Please replace, without prejudice or disclaimer, pending claims 1 and 2 with each amended version shown below, and add new claims 5-14 as follows:

1. (Twice Amended) A method of enhancing adhesion between silica and epoxy resin, comprising:
coating the surface of said silica by plasma polymerization coating with a monomer selected from the group consisting of 1,3-diaminopropane, allylamine, pyrrole, 1,2-epoxy-5-hexene, allylmercaptan, and allylalcohol, wherein said plasma